theoretical deductions from the results already obtained. I have satisfied myself, however, as to the following two points:

1. That uric acid is present in the blood of birds.
2. That as far as my observations go, there is no evidence in support of the view advanced by Garrod and Luff that the kidney is the main seat of formation of uric acid.

In conclusion I must in the first place express my indebtedness to Professor Rutherford for allowing the research to be carried out in his laboratory, and for valuable suggestions in connection with it. I have further to express my special indebtedness to his assistant, Dr. T. H. Milroy, for much valuable assistance throughout the whole investigation. I am also indebted to Dr. Selby, Wigtonshire, for the large quantities of blood examined, and to Professor Mettam, Veterinary College, for kindly giving me the viscera of the snake. The expenses incurred in the investigation were covered by a grant received from the Moray Research Fund of this University.

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ON BELLADONNA IN THE TREATMENT OF BRONCHO-PNEUMONIA IN CHILDREN.*

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I WILL preface what I have to say by stating that I hold to the prevalent belief that there is an essential difference between croupous pneumonia and broncho-pneumonia in children. Cases, it is true, are not uncommon in which, judging from the physical signs alone, there may be extreme difficulty at the outset in determining to which class, croupous or catarrhal, they rightly belong. This difficulty doubtless arises from the fact that a well-defined patch of croupous pneumonia in young children is apt to be accompanied by small patches of collapse, and subsequent consolidation, in the immediately surrounding pulmonary tissues. Here the signs of broncho-pneumonia may complicate, or follow upon, those belonging to a case essentially of the croupous form at the outset of the illness. The course or termination of the attack, in the vast majority of instances, generally helps to clear up any hesitation in deciding as to the variety to which they mainly belong. Apart from such doubtful, or rather mixed, cases, however, in which there may be temporary room for doubt in classification, there is a vast majority of typical cases in each section, in which the initial symptoms, the course of the complaint, the parts of the lungs affected, the physical signs, the termination, and sequelæ are sufficiently distinct to differentiate sharply between them.

For these reasons I am not inclined to agree with some views recently put forward as to the identity of the two complaints in children. These views, too, are mainly founded on bacteriological grounds, and, in my opinion, the bacteriology of either form is not as yet sufficiently established to upset the prevalent belief in the distinctive character of the two complaints. As furnishing one criterion between them, I might appeal to the totally differing mortalities in the two forms of the complaint. At the Shadwell Children's Hospital, even with weakly East End children, a mortality of 10 per cent. would be above the mark in cases diagnosed as croupous pneumonia. In contrast with this, in cases diagnosed as broncho-pneumonia the mortality has generally, in children under the age of 2 years at least, ranged from 60 to 80 per cent. This increased mortality, if it establishes nothing else, sufficiently demonstrates the greater gravity of cases diagnosed by several observers as broncho-pneumonia over those

diagnosed by the same set of observers as belonging to the croupous form.

There is a wide difference, too, in the treatment of the two complaints. In the majority of cases of croupous pneumonia all that is needed is careful nursing and feeding, any active interference on the part of the physician being seldom called for. On the other hand, in the majority of cases of catarrhal pneumonia every remedy that experience or ingenuity could suggest has been invoked. Foremost among these have been such measures as steam tents, inhalations of oxygen heated over steam coils or given cold, injections of strychnine, alcohol in large doses and other drug stimulants, dry cupping, leeching, and emetics. With such active treatment, doubtless many a life has been saved. But in spite of all these, coupled with the most devoted attention of the nursing and resident medical staffs, our mortality in broncho-pneumonia remained appallingly high. Any remedy that would serve to diminish this mortality deserves consideration. Such a remedy we think at present we have found at Shadwell, in somewhat large doses of belladonna.

It is known, although I believe not as widely or generally as its importance deserves, that cases of that very fatal sequela of diphtheria—paralysis of the diaphragm—can often be cured by pushing belladonna or atropine to their full physiological limits. Since using belladonna or atropine in full doses a large proportion of such cases have recovered. For the knowledge of this property of belladonna I am indebted to several members of the staff of the Great Ormond Street Hospital. From no one, however, could I gain any satisfactory explanation as to how the drug acted. The only one afforded me was that belladonna in some way stimulated the respiratory centre, and so the effect of the diaphragmatic palsy was counteracted by over-exertion on the part of the other respiratory muscles.

To me, I confess, such an explanation was far from a convincing one. I could not conceive any drug acting continuously as a stimulant on the respiratory centre for the three or four days during which the greater stress of the palsy lasts, without there being corresponding times when this hyper-stimulation would be replaced by depression and its attendant evils. Whilst, then, accepting the fact of the beneficial action of belladonna in palsy of the diaphragm, I was compelled to leave any explanation of its mode of action to the unsatisfactory region of the empirical.

About a year ago, however, renewed attention was called, I think by Dr. Ringer, to the marked effect atropine had in limiting or diminishing secretion into the bronchial tubes and pulmonary tissues. It was pointed out that numerous patients recovered from the immediate effects of an operation, merely to die in three or four days choked by the undue effusion into the bronchial tubes, induced by the action of the ether or other anæsthetic used at the time of operation. For the prevention of this water-logging of the lungs from the anæsthetic it was proposed that patients for several days after operation should be treated with atropine or belladonna. Such a practice is, I believe, carried out in a routine manner in at least one large London hospital.

This view of the action of belladonna seemed to me to furnish the explanation wanted of its beneficial action in diphtherial paralysis of the diaphragm. Belladonna, I would suggest, has no direct influence on the course of such paralysis, it merely prevents or diminishes the secondary pulmonary effects consequent on it, and so staves off an impending asphyxia. In this view of its action, too, the routine treatment of diphtherial paralysis with belladonna, practised by some eminent specialists, and doubtless founded on experience gained from cases of paralysis of the diaphragm, to my mind is illogical and likely to be futile, unless the last named grave complication is present or threatening.

For reasons based on the above conclusions I determined to give belladonna a trial in the treatment of broncho-pneumonia in children. If the drug possessed the powers ascribed to it, then it seemed to me that in broncho-pneumonia, with its free secretion into the bronchial tubes and pulmonary tissues, just such conditions obtained as the drug would control and counteract. So far it has more than answered all that I could have hoped for. With it as the sole drug administered there has been in my cases no need for steam tents, oxygen inhala-

* Read before the West Kent Branch of the British Medical Association, at Gravesend.

tions, unlimited stimulations, dry cupping, and all the rest of the former varied and trying treatment.

Out of several dozen cases treated with belladonna Dr. Shardlow, our resident medical officer, tells me he can only recollect a couple of deaths. Case after case of the complaint in young infants, in the majority of whom with the former treatment one would have anticipated a fatal termination, has, seemingly owing to belladonna, made a rapid and complete recovery. Sisters in the wards, with a vivid recollection of former methods and their discouraging results, entertain no doubt of the superiority of the later treatment. My colleague, Dr. Eustace Smith, too, is convinced on the same point, and is much struck with the rapidity with which all the symptoms clear up when belladonna is pushed. The same opinion is held by all the resident medical staff as well, and they have, I believe, now come to regard the drug as almost a specific in the complaint. In two cases in private practice lately, when I was called in, the doctors in attendance had already given a practically hopeless prognosis. Both were cases of severe broncho-pneumonia following measles, a complication admittedly grave. In the light of my early experience of such cases I would have inclined to agree with the prognosis already given in each of these cases. More recent experience, however, with belladonna enabled me to modify the prognosis, and both infants did me credit by making a rapid and thorough recovery under that drug.

So far, then, as regards mortality, my experience with the drug is everything that is favourable. I only wish that I could look with any certainty to future experience confirming these happy impressions in so grave a malady as broncho-pneumonia in children. But in the remarkably small death-rate in my cases at present, I cannot but feel I have been largely favoured by chance. If it were possible wholly to eradicate the complaint by any method of treatment, yet the state of depression remaining after so severe a malady as broncho-pneumonia must result in the deaths of many children. Still, if the death-rate were many times greater with the belladonna treatment than it has proved up to the present in my experience, even then I would claim a distinct advantage for it over any other treatment that I am acquainted with. Dr. Shardlow and Mr. Elwin Nash, our present house-physician, propose publishing a joint paper, giving details and statistics of cases treated with and without belladonna at the end of the present year. Such a paper should prove of value and interest, whether it confirm or refute my present impressions.

It is not only with regard to the mortality, moreover, that my experience with belladonna in broncho-pneumonia is such a favourable one. A very few doses in most cases have relieved the dyspnoea. In a large number, perhaps the majority, the temperature has fallen to normal very soon after the commencement of the treatment. Cases, too, that with former methods might have been expected to run a course of several weeks' duration have, with belladonna treatment, lasted only a corresponding number of days. Other advantages seemingly gained might perhaps be enumerated, but I think sufficient have been adduced in justification of the trial of the drug.

There is of course nothing novel in the treatment. Doubtless many, if not most, of us have used belladonna in various chest complaints in infants and young children. To what then, you may ask, do I attribute my more favourable results over those of others who may have formerly used the drug for the same complaint? The answer perhaps lies in the fact that I have used the drug in larger quantities than usually prescribed, and also, perhaps, a more reliable preparation. The tincture of the late *Pharmacopœia*, the preparation usually prescribed, is now admittedly a most unreliable one. That of the new *Pharmacopœia*, made from a standardised liquid extract, will doubtless prove all that is desirable, but I have as yet never tried it. The preparation I have used is the extract of the late *Pharmacopœia*. This, I am told, is far from being above suspicion as regards certainty of composition, but in this respect far more trustworthy than its corresponding tincture. This extract I have given in doses of $\frac{1}{4}$ gr. every three or four hours. I have made no distinction, too, in the dose as regards the age of the patient, and have given the same dose to an infant a few weeks old as to a child of 6 or 7 years.

The disadvantages attaching to these somewhat large doses have been singularly slight and unimportant. Out of perhaps 50 or 60 cases in two there has been slight delirium, which was easily cured by lessening the dose. In a large majority, however, there has been some flushing of the skin, and in some a definite scarlet rash. This flushing, somewhat to my surprise, has been more frequent than noticeable dilatation of the pupils. The sisters in the wards, too, tell me that they have noticed that children under the influence of the drug are unduly irritable and restless. Some of this last may, however, be ascribable to the condition left on recovery from acute disease. But were the disadvantages infinitely greater than those described, I still think they might fairly be neglected in comparison with the advantages seemingly gained from the use of the drug.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

THE CONTROL OF HÆMORRHAGE IN OPERATIONS FOR THE REMOVAL OF LABIAL ELEPHANTIASIS.

CAPTAIN J. B. SMITH, M.B., of the Indian Medical Service, has recorded in the *BRITISH MEDICAL JOURNAL* of January 21st, p. 148, a case of removal of elephantiasis of the vulva weighing 5 or 6 lbs., in which, after making an incision which bled alarmingly, he resorted to the expedient of passing ligatures through the neck of the tumour, which secured it in sections; these were divided successively, and the vessels of each section were tied before the next was cut through. In this manner the removal of the mass was accomplished without much loss of blood. I have on several occasions adopted this expedient with satisfactory results. In the *Indian Medical Gazette* (vol. xvi for 1881, p. 154) I published a case of labial elephantiasis in which "bleeding was prevented by preliminary ligature of the pedicle with whipcord." The tumour weighed 7 lb. 10 oz., and the patient made a good recovery. In another case (vol. xviii for 1883, p. 151) the base of the tumour, weighing 3 lb. 4 oz., was "tightly ligatured with whipcord passed through it by means of a hernia needle," result recovery. Two other successful cases, in which the tumours weighed 6 lb. 4 oz. and 3 lb. 4½ oz. are recorded in the same journal (vol. xviii, *loc. cit.*, and vol. xix for 1884, p. 105). These cases are quoted in a work on *Operative Surgery in the Calcutta Medical College*, which I published in 1885 (J. and A. Churchill). I found the method effective enough but it took some time to pass, and tie the ligatures and the removal of the tumour had to be done somewhat awkwardly, tediously, and roughly. A much more satisfactory and efficient method of controlling hæmorrhage in these cases is the use of the elastic cord as for removal of scrotal elephantiasis as originally described by me in the *Indian Medical Gazette*, vol. xvii for 1882, p. 284, and subsequently detailed in Heath's *Dictionary of Surgery* (article—Scrotal Elephantiasis) and in the work above referred to (p. 136). The application of this plan to labial operations was suggested to me by my colleague, Colonel D. O'C. Raye, M.D., then Professor of Anatomy in Calcutta Medical College. The success of the expedient is well illustrated by the following case quoted from the *Indian Medical Gazette* (vol. xxv for 1890, p. 169):

"Hindu female, aged 26. Large pendulous tumour of left labium reaching to the knee, ulcerated at fundus. The elastic cord was applied as in scrotal tumours and the mass removed; edges of wound stitched together after the vessels had been tied. Tumour weighed 14 lbs. Recovery in twenty days."

The advantages of this method of controlling hæmorrhage in operations on the male and female genitals, and it is applicable to all operations, are:

1. The facility and speed of application.
2. The absolute prevention of bleeding.
3. The absence of displacement or distortion of parts, and great freedom of working.
4. The gradual relaxation of pressure.
5. The possibility of accurate and deliberate dissection, and